



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

**ON THE MARINE FAUNAL REGIONS OF THE NORTH PACIFIC; AN  
INTRODUCTORY NOTE TO THE REPORT ON ALASKAN HYDROIDS, BY  
MR. CLARK.**

BY W. H. DALL, U. S. COAST SURVEY.

Mr. Clark's paper is the first of what is hoped will form a series, by different specialists, on the collections of marine invertebrates, obtained by me, with the co-operation of my party and other persons interested, during a period extending over nearly ten years. The first explorations in that region were begun in 1865, under the direction of the late lamented Robert Kennicott, and by the courteous co-operation of the officers of the Western Union Telegraph Company. Since the death of Mr. Kennicott the direction of the work has devolved upon me. By far the richest portion of the invertebrate collections has been obtained between 1871 and 1875, while engaged on hydrographic work for the U. S. Coast Survey. During the whole period mentioned the work has been aided by the earnest co-operation of the Smithsonian Institution, a circumstance to which is due a large part of our success.

Among those persons to whom we owe thanks for assistance in forming the collections, and to whom I beg to express my sense of indebtedness, are particularly to be mentioned Capt. E. E. Smith, of San Francisco, whose energetic dredgings in the Arctic Ocean have furnished nearly all our material from that region; Mr. Bernhard Bendel, formerly stationed at Unalashka; and Messrs. W. G. Hall, E. P. Herendeen, A. R. Hodgkins, Sylvanus Bailey, Mark W. Harrington, Marcus Baker, and Wm. M. Noyes, attached for shorter or longer periods to the Coast Survey party under my charge. To the officers directing the U. S. Coast Survey I have been indebted for hearty co-operation.

In April, 1873, I gave a short notice of the principal faunal regions into which the information gained in the field seemed to permit the division of the coast of Alaska. Mr. Clark's independent reasoning from a study of the hydroids alone, confirms in every particular the opinions then expressed, and information gained since 1873, seems to offer only additional confirmation of the views held by me at that time, with some interesting additions.

A brief statement of these views will be in place here.

The coast of Alaska and northwest America from Monterey, California, north and west may be divided into three faunæ.

### I. *The Oregonian Fauna.*

This extends from Monterey to the Shumagin Islands.

### II. *The Aleutian Fauna.*

The range of this province is from the Shumagins westward throughout the Aleutian chain, and northward to the winter line of floating ice in Bering Sea; a line extending westward from Cape Newenham toward and grazing the Pribiloff group, and thence to the western termination of the Aleutian chain, bounded by the depth of the water in Bering Sea, extending probably to no greater depth than five hundred fathoms, and entirely cut off from the adjacent coasts of Asia.

### III. *The Arctic Fauna.*

This well-recognized fauna passes in water over five hundred fathoms in depth indefinitely southward on the ocean bottom. By the shores it is limited by the winter line of floating ice, or water of the temperature of thirty-two Fahrenheit at the surface, for a certain proportion of the year.

The species belonging to this fauna creep southward along the shores to the northernmost islands of Japan on the west coast and Cape Newenham on the east coast of the ocean of this region. Many of them extend even further south; as the species of Arctic habitat have a greater facility of adaptation to other than their normal conditions than those of any other existing fauna.

The material derived from the coasts of N. W. America, from Cook's Inlet south and east, indicate a series of Arctic colonies in favored localities, the future exploration of which offers a labor of the highest interest. These colonies are situated where the depth of water, the drippings of glaciers, and the high and adjacent shores of the Great Archipelago, combine to reduce the temperature of the water below its apparently normal isotherm. Cook's Inlet affords one of them, one exists in the Gulf of Georgia, and others only await further exploration.

In these colonies we find strictly Arctic species, such as normally abound in the vicinity of Icy Cape; islands of polar life surrounded by shoaler water; forms altogether alien to them. In the absence of information as to depth and temperatures, collections made at such localities would indicate to the student only inextricable confusion of different faunæ.

The species of each fauna are not, of course, rigidly bound

within the limits above set forth. According to their various degrees of adaptability to the surroundings, they creep south or north from their own proper region, until their limit of temperature is reached.

Nevertheless the course of currents, the changes in depth and the variation in temperature, are so far co-ordinate that the limits herein mentioned may be taken as approximately exact for the mass of species.

I would here reiterate the view published by me in 1868, that temperature, and temperature alone, is the great factor in determining the limits of marine faunæ. Depth, salinity, specific gravity, motion or quietness in the water, and geological character of the shores and sea bottom have their influence in determining the distribution and individual characters of particular species or small groups of species; but for marine faunæ, all my field observations lead to but one conclusion, that they are absolutely dependent on the water temperatures. It is hardly necessary to point out, in view of recent deep sea researches, that the ocean valleys which so sharply separate adjacent faunæ, are in such cases valleys of depressed temperature as well as depressed sea-bottom. Leaving out strictly littoral or shore forms, restricted by the nature of their food to very moderate depths, no case is known to me in which a deep sea valley, not containing colder water than that on either side of it, separates two great marine faunal provinces. Local subfaunæ are not here considered.

The geological formation supplies the elements of plant life; the phytophagous mollusks are distributed where they can obtain their favorite food. All formations supply some algæ, and the zoöphagous mollusks can find some food almost anywhere. They are therefore the best indices of faunal provinces in their own subkingdom. Something similar is probably true of other groups of marine animals. The mollusks are here referred to as the group with which I have the greatest familiarity. A striking instance of this local distribution is afforded by granitic areas. On the Alaskan coast these appear to afford special opportunities for the growth of the red or chlorospermous algæ. In granitic districts they are quite abundant compared with what we know of their occurrence in sandstone or basaltic regions. Here also we find a number of species which prefer red algæ as food, and a notable tendency to rosinness in the coloring of shells and annelids.

Other details of a similar nature are reserved for future publication.

In regard to the collection of hydroids it may be remarked that the collection illustrating the Arctic province was very small, and by no means sufficient to represent it fairly.

The Oregonian province is also less fully represented than is desirable. For the Aleutian region the collection is tolerably full, though it cannot be doubted that many of the more minute or delicate forms were overlooked. However, Mr. Clark's paper forms a desirable contribution to our knowledge of a little known region, and must be regarded as a considerable advance on our previous information. It is to be expected that a fuller investigation of the Arctic province will reveal many more circumpolar species, and in the Oregonian fauna a fuller representation of those already known from the Californian coast.

The types of the species mentioned are deposited in the National Museum in charge of the Smithsonian Institution at Washington; a series has also been placed in the Peabody Museum of Yale College, and in the Museum of the University of Michigan.